

User Guide

Elcometer 3000

Motorised and Manual Clemen Unit

CONTENTS

| Section | Page |
|--|-------|
| 1 Overview | en-2 |
| 2 Box Contents | en-3 |
| 3 Working Safely | en-3 |
| 4 Getting Started | en-4 |
| 5 Testing a Sample - Manual Clemen Unit | en-4 |
| 6 Testing a Sample - Motorised Clemen Unit | en-6 |
| 7 Spares & Accessories | en-9 |
| 8 Care & Maintenance | en-9 |
| 9 Warranty Statement | en-10 |
| 10 Technical Specification | en-10 |
| 11 Legal Notices & Regulatory Information | en-11 |



For the avoidance of doubt, please refer to the original English language version.

Dimensions: Manual Clemen Unit: 410 x 200 x 155mm (16.1 x 7.9 x 6.1")
 Motorised Clemen Unit: 460 x 280 x 330mm (18 x 11 x 13")

Weight: Manual Clemen Unit: 6kg (13.2lb)
 Motorised Clemen Unit: 20kg (44lb)

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1 OVERVIEW

Available in two versions; Manual and Motorised, the Elcometer 3000 Clemen Unit is a robust and simple-to-use instrument for evaluation of the resistance to scratching of a coated surface. The sample can be metal, wood, glass, plastic or other hard materials.

A tool fitted with a hemispherical ball is lowered gradually onto the surface of the sample and moved in a straight line a distance of 60mm (2.4"). The downward force exerted by the tool onto the surface is adjustable by means of a sliding weight.

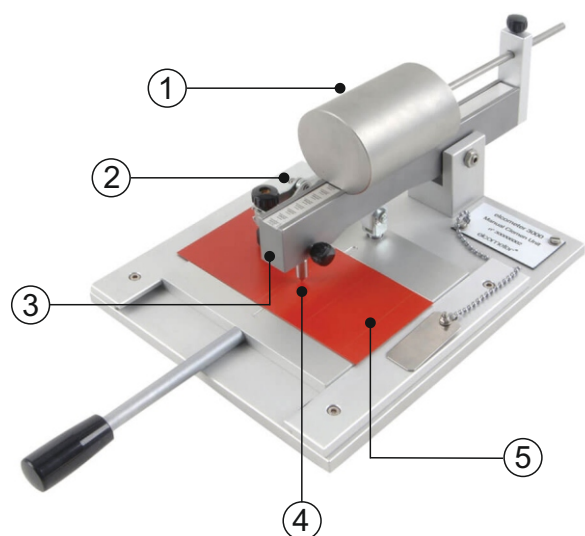
Depending on the purpose of the test and the force applied, varying degrees of penetration of the tool into the coating are observed, from a superficial trace to total destruction.

Elcometer 3000 Manual Clemen Unit: The sample is clamped to a sliding platform which is moved manually.

Elcometer 3000 Motorised Clemen Unit: The sample is clamped to a fixed platform. At the press of a button, the tool is moved across the sample and stops automatically at the end of its travel. Contact between the tool and a metallic sample is indicated by a lamp and voltmeter.

1.1 MANUAL CLEMEN UNIT

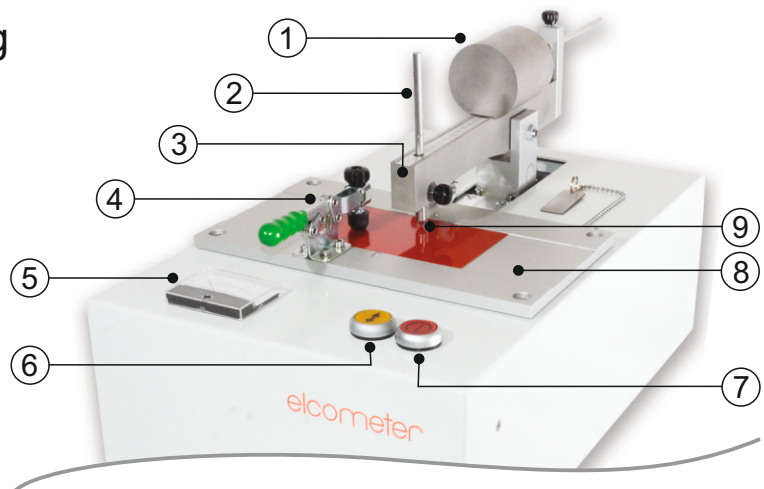
- 1 Weight
- 2 Clamp
- 3 Load Beam
- 4 Tool
- 5 Sample Platform



1 OVERVIEW (continued)

1.2 MOTORISED CLEMEN UNIT

- 1 Weight
- 2 Support for additional 1kg (2.2lb) weights
- 3 Load Beam
- 4 Clamp
- 5 Voltmeter
- 6 Start Button
- 7 Power On/Off Button
- 8 Sample Platform
- 9 Tool



2 BOX CONTENTS

- Elcometer 3000 Clemens Unit
- Tungsten Carbide Ball Tool; 1mm (0.04")
- Calibration Certificate - *if ordered*
- User Guide

Additional items supplied with the Elcometer 3000 Motorised Clemens Unit

- 1kg Weight (x4)
- Mains Leads: UK, EUR & US

The Elcometer 3000 Clemens Unit is packed in a plywood and / or heavy duty cardboard and foam package. It is recommended that this packaging is retained and reused in the event that the instrument needs to be transported. If the packaging is disposed of, please ensure that this is done in an environmentally sensitive manner. Consult your local Environmental Authority for further guidance.

3 WORKING SAFELY



To reduce the risk of electric shock, do not open the housing of the Elcometer 3000 Motorised Clemens Unit. There are no user-servicable parts inside. The warranty will be invalidated if the instrument has been opened.



To reduce the risk of fire or electric shock, do not expose the Elcometer 3000 Motorised Clemens Unit to rain or excess moisture.

3 WORKING SAFELY (continued)

The IEC inlet is protected by one fuse - see Section 10 'Technical Specification' on page en-10 for fuse rating.

The UK mains plug is fitted with a fuse. When replacing this fuse, ensure a fuse of the correct rating is used - see Section 10 'Technical Specification' on page en-10 for details.

Elcometer recommends using mains leads approved by a recognised testing authority. Examples of suitable mains leads are UK, EUR H05RN-F 3G 0.75mm² cable, US SJT 18AWG/3C cable.

4 GETTING STARTED

4.1 INSTALLATION



The Elcometer 3000 Motorised Clemen Unit is heavy; manual lifting of the tester must be carried out by at least two people.

Place the Elcometer 3000 on a flat level surface suitable for the load imposed by the tester. The Elcometer 3000 Motorised Clemen Unit has adjustable feet which can be used to level the tester.

4.2 SWITCHING ON / OFF - MOTORISED CLEMEN UNIT ONLY

Press the On/Off button to switch the unit on. The button will illuminate when the unit is switched on. Press the On/Off button again to switch the unit off.

5 TESTING A SAMPLE - MANUAL CLEMEN UNIT

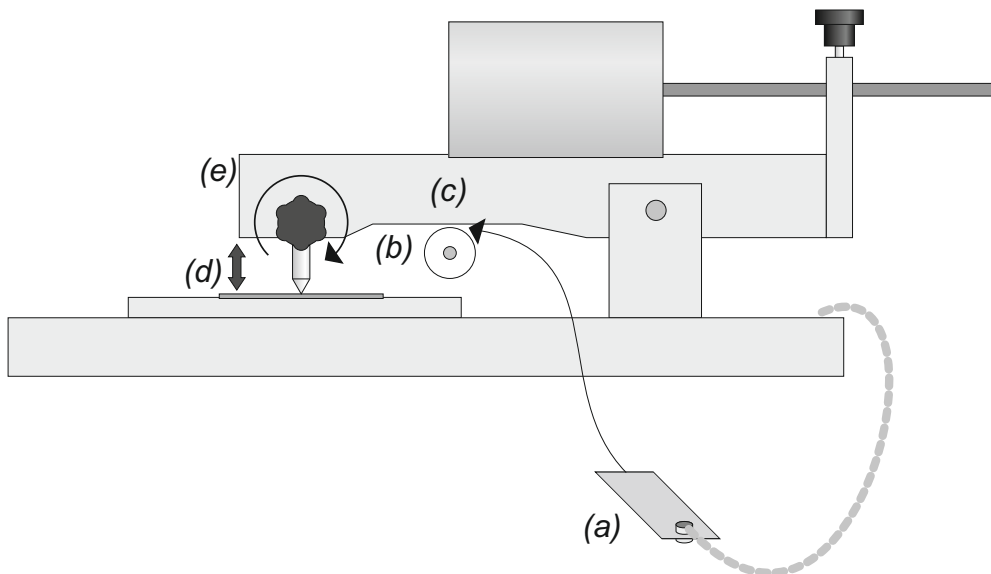
Before a sample can be tested, the height of the tool must be adjusted.

5.1 ADJUSTING THE TOOL HEIGHT

- 1 Place the sample onto the sample platform and fix into position by rotating the clamp handle.
- 2 Lift and hold the load beam in its raised position and slide the sample platform until the centre of the sample is underneath the tool.

5 TESTING A SAMPLE - MANUAL CLEMEN UNIT (continued)

- 3 Insert the metal shim (a) between the nylon wheel (b) and the load beam (c) and then lower the load beam.
- 4 Adjust the height of the tool (d) until it is touching the surface of the sample then tighten the knurled wheel (e), turning clockwise, to lock the tool into position.



- 5 Raise the load beam, remove the metal shim and slide the sample platform back to its starting position.
- 6 Slide the weight along the load beam to the required load and lock in place by tightening the knurled wheel. The load can be set from 0 to 2kg (0 to 4.4lb).

The instrument and sample are now ready for the test to be carried out.

5.2 TEST PROCEDURE

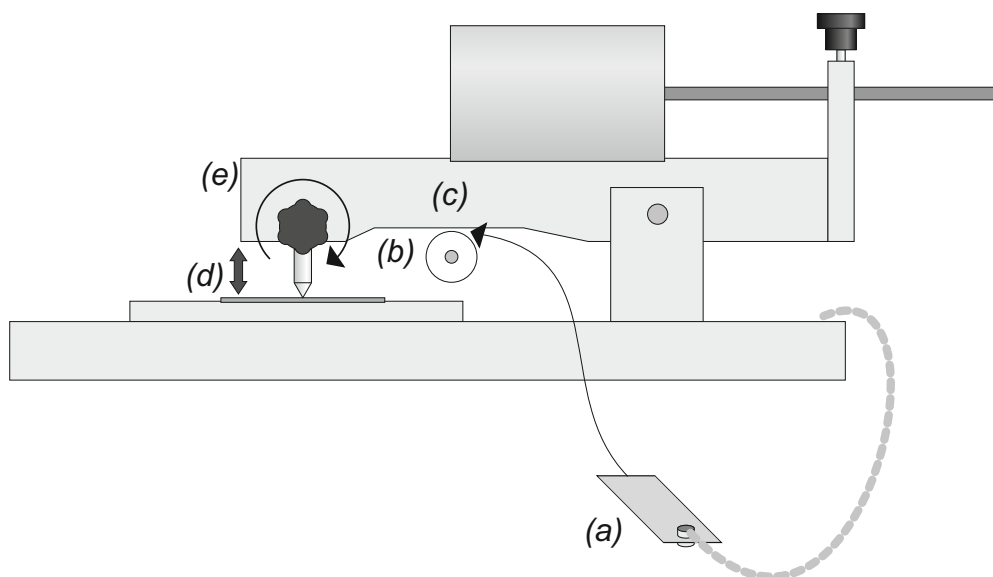
- 1 Pull the sample platform towards you in a single smooth action; the standard speed of movement is approximately 30mm/s (1.2"/s).
- 2 The tool will lower down onto the sample at the start of the test and raise up at the end of the test.
- 3 Inspect the sample for damage in accordance with the requirements of the test standard. Repeat the test as necessary, increase the loading between test.

6 TESTING A SAMPLE - MOTORISED CLEMEN UNIT

Before a sample can be tested, the height of the tool must be adjusted.

6.1 ADJUSTING THE TOOL HEIGHT

- 1 Connect the unit to the mains power supply and press the Power On/Off button to switch on the instrument.
- 2 Place the sample onto the sample platform and fix in position by rotating the clamp handle.
- 3 Adjust the height of the tool to its upper position to clear the sample.
- 4 With the tool positioned at either end, press the Start button then immediately press the Power On/Off button. This will stop the load beam near the centre.
- 5 Insert the metal shim (a) between the nylon wheel (b) and the load beam (c) and then lower the load beam.
- 6 Adjust the height of the tool (d) until it is touching the surface of the sample then tighten the knurled wheel (e), turning clockwise, to lock the tool into position.



- 7 Raise the load beam, remove the metal shim and whilst supporting the load beam, press the Power On/Off button followed by the Start button to return the tool to its starting position.
 - ▶ Supporting the load beam whilst the tool is moving to its starting position prevents damage to the sample surface, the tool or the sample platform.
- 8 Slide the weight along the load beam to the required load and lock in place by tightening the knurled wheel. The load can be set from 0 to 1.5kg (0 to 3.3lb) using the sliding weight.

6 TESTING A SAMPLE - MOTORISED CLEMEN UNIT (continued)

For loads between 1.5 and 5kg (3.3 and 11lb) use the additional 1kg (2.2lb) supplied. Place the required number of weights on the vertical rod on the load beam to obtain the correct load. For example, if a load of 3.5kg (7.7lb) is required, place three of the 1kg (2.2lb) weights on to the vertical rod and slide the weight to the 0.5kg (1.1lb) mark on the scale.

The instrument and sample are now ready for the test to be carried out.

6.2 TEST PROCEDURE



Keep fingers clear of the mechanism during use.

- 1 Press the Start button. The tool will start to move and will lower down onto the sample at the start of the test, raise up at the end of the test and then stop automatically.
- 2 Inspect the sample for damage in accordance with the requirements of the test standard. Repeat the test as necessary, increase the loading between test.

The complete destruction of a paint film on a metallic sample is observed when the voltmeter needle indicates 10 V to 12 V and when the Start button flashes (the electrical detection device operates only on metallic samples which are uncoated on the reverse side).

6.3 TESTING THICK SAMPLES

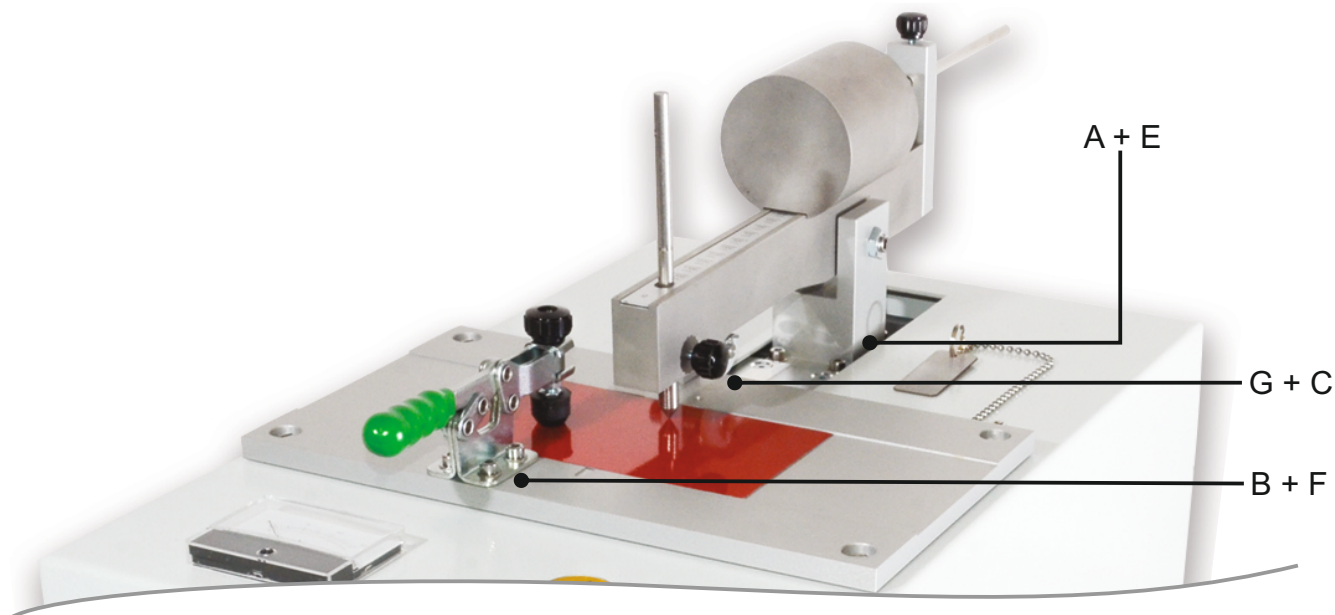
The Elcometer 3000 Motorised Clemen Unit as supplied can be used to test samples with a maximum thickness of 3mm (0.12"). An Adjustment Kit is available to purchase as an optional accessory which allows testing of samples up to 20mm (0.8") thick.

The Adjustment Kit consists of the items listed below. Refer to Figure 1 on page en-8 for the location of the parts.

| Part | Description | Qty |
|------|-------------------------------------|-----|
| A | Load Beam Spacer; 55 x 39 x 5mm | 3 |
| B | Sample Clamp Spacer; 35 x 30 x 12mm | 1 |
| C | Height Gauge for Wheel; 5 & 15mm | 1 |
| | Height Gauge for Wheel; 10 & 20mm | 1 |

6 TESTING A SAMPLE - MOTORISED CLEMEN UNIT (continued)

| Part | Description | Qty |
|------|--------------------------------|--------|
| D | Hexagonal Wrench; 3mm | 1 |
| E | M4 x 20 Screw for Load Beam | 4 sets |
| F | M4 x 25 Screw for Sample Clamp | 2 sets |
| G | Height Adjustable Wheel | 1 |



Fit the parts in accordance with the recommendations given in the table below.

| Sample Thickness | | 5mm Spacers for Load Beam Base (Qty) | 12mm Spacer for Sample Clamp | Height Gauge for Wheel |
|------------------|------------|--------------------------------------|------------------------------|------------------------|
| mm | inches | | | |
| 0.5 - 5 | 0.02 - 0.2 | 0 | Not Required | 5mm |
| 5 - 10 | 0.2 - 0.4 | 1 | Not Required | 10mm |
| 10 - 15 | 0.4 - 0.6 | 2 | Required | 15mm |
| 15 - 20 | 0.6 - 0.8 | 3 | Required | 20mm |

Note:

- 1) Fit the load beam base and sample clamp to the spacers using screws of an appropriate length (Parts E & F above).
- 2) Use the height gauge (Part C above) to adjust the height of the nylon wheel and then tighten the knurled wheel to lock in place.

7 SPARES & ACCESSORIES

7.1 BALL TOOL

Each Elcometer 3000 is supplied with a 1mm (0.04") tungsten carbide ball tool as standard.

Due to the nature of the test, the ball tool will wear with use. Spare / replacement tools are available to purchase from Elcometer or your local Elcometer supplier.

| Description | Part Number |
|---|--------------|
| Tungsten Carbide Ball Tool; 1mm (0.04") | KT003000P021 |

7.2 CUTTING TOOL FOR SCRATCH TESTING

Available to purchase as an optional accessory, the cutting tool gives a much more aggressive scratch than the standard ball tool supplied with each instrument. When using the cutting tool, follow the same adjustment procedure and test procedure as given for the standard ball tool.

| Description | Part Number |
|--|--------------|
| Tungsten Carbide Cutting Tool; 2mm (0.08") | KT003000N001 |

7.3 ADJUSTMENT KIT

Available to purchase as an optional accessory for the Elcometer 3000 Motorised Clemen Unit, the adjustment kit allows testing of samples up to 20mm (0.8") thick - see Section 6.3 'Testing Thick Samples' on page en-7 for further details.

| Description | Part Number |
|--|--------------|
| Adjustment Kit from 5 - 20mm/0.02 - 0.8" | KT003000N015 |

8 CARE & MAINTENANCE

The top of the instrument around the test sample area should be regularly wiped clean using a dry cloth.

The Elcometer 3000 does not contain any user-serviceable components. In the unlikely event of a fault, the instrument should be returned to your local Elcometer supplier or directly to Elcometer.

The warranty will be invalidated if the instrument has been opened.

9 WARRANTY STATEMENT

The Elcometer 3000 is supplied with a 12 month warranty against manufacturing defects, excluding contamination and wear.

Replacement consumable parts and accessories, including but not limited to, ball and cutting tools, are excluded from the warranty.

10 TECHNICAL SPECIFICATION

| 10.1 ELCOMETER 3000 MANUAL CLEMEN UNIT | |
|---|---------------------------------------|
| Load Range | 0 - 2kg (0 - 4.4lb) |
| Sample Size | 75 x 150mm (3 x 6") |
| Sample Thickness | 0.5 - 3mm (0.02 - 0.12") |
| Dimensions | 410 x 200 x 155mm (16.1 x 7.9 x 6.1") |
| Weight | 6kg (13.2lb) |
| Can be used in accordance with: AS/NZS 1580.403.1, BS 3900-E2, DIN 53799, ECCA T12, EN 13523-12, ISO 1518-1:2011 | |

| 10.2 ELCOMETER 3000 MOTORISED CLEMEN UNIT | | |
|---|--|--------------------------|
| Load Range | 0 - 5kg (0 - 11lb) | |
| Sample Size | 75 x 150mm (3 x 6") | |
| Sample Thickness | Standard: | 0.5 - 3mm (0.02 - 0.12") |
| | Extended ^a : | 5 - 20mm (0.2 - 0.8") |
| Operating Voltage | UK / EU: | 230V AC; 0.1A; 50Hz |
| | US: | 120V AC; 0.2A; 60Hz |
| Transient Overvoltage | Category II | |
| Fuse Rating | Power Inlet: | 1 x T2AH250V |
| | DC Fuse ^b : | 1 x T315MAH250V |
| | UK Plug: | 1 x T3AH250V |
| Operating Temperature (ambient air) | 5 to 40°C (41 to 104°F) | |
| Transportation & Storage Temperature | -10 to 55°C (14 to 131°F) | |
| Humidity Range | Not to exceed 80% relative humidity up to 31°C (88°F), decreasing linearly to 50% at 40°C (104°F). | |
| continued on page en-11 | | |

^a Using the optional Adjustment Kit - see Section 6.3 'Testing Thickness Samples' on page en-7.

^b Located above power inlet.

10 TECHNICAL SPECIFICATION (continued)

| 10.2 ELCOMETER 3000 MOTORISED CLEMEN UNIT (continued) | |
|--|-----------------------------------|
| Pollution Degree | 2 |
| Enclosure IP Rating | IP20 |
| Dimensions | 460 x 280 x 330mm (18 x 11 x 13") |
| Weight | 20kg (44lb) |
| Note: For indoor use only at altitudes up to 2000m (6562ft). Mains supply fluctuations up to 10% of the nominal voltage. Temporary overvoltages occurring on the supply. | |
| Can be used in accordance with: AS/NZS 1580.403.1, BS 3900-E2, DIN 53799, ECCA T12, EN 13523-12, ISO 1518-1:2011, JIS K 5600-5-5 | |

11 LEGAL NOTICES & REGULATORY INFORMATION

Declaration of Conformity:

The Elcometer 3000 Motorised Clemen Unit complies with the requirements of the following EU Directives:

2006/42/EC Machinery Directive, as amended by 2009/127/EC and 2014/33/EU

2014/30/EU Electromagnetic Compatibility

The Declaration of Conformity is available to download via:

www.elcometer.com/images/stories/PDFs/Datasheets/Declaration_of_Conformity/English/DoC_3000_Motorised.pdf

This product is Class B, Group 1 ISM equipment according to CISPR 11.

Class B product: Suitable for use in domestic establishments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Group 1 ISM product: A product in which there is intentionally generated and/or used conductively coupled radio frequency energy which is necessary for the internal functioning of the equipment itself.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help.

To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Modifications not expressly approved by Elcometer Limited could void the user's authority to operate the equipment under FCC rules.

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All other trademarks acknowledged.

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Head-Office: Elcometer Limited, Edge Lane, Manchester, M43 6BU, United Kingdom.

